MOTTA LUBRICATION | TECHNICAL GUIDANCE

CIRCULATING & TURBINE OIL SERIES H30 / H10 / H50 / T50 / T100

OPERATION AND HANDLING INSTRUCTIONS

Document no.	Revision	Issue date	Release status
MOTTA-CIRC-OHI-EN	REV.02	2026-09-13	Issued for use

Use with the current product TDS, SDS and the equipment manufacturer's instructions. Issued by MOTTA Lubricants. The current revision of this document is published at motta-lube.com/documents/ — if your copy differs, that list governs.

1 Scope

This document applies to the storage, filling, start-up, in-service monitoring, shutdown and oil change of the MOTTA circulating and turbine oil series: H30 and H10 circulating oils, H50 synthetic paper-machine oil, T50 turbine oil and T100 zinc-free turbine oil. For use only by trained personnel on equipment whose condition has been confirmed.

Not covered: hydraulic systems for which the manufacturer specifies an anti-wear hydraulic oil; enclosed gear drives that require an EP gear oil; air and refrigeration compressors; and heavy-duty gas turbines whose manufacturer specifies a synthetic or high-temperature turbine oil, unless suitability is confirmed in writing.

The equipment manufacturer's instructions, the product TDS and SDS, site procedures and local regulations take precedence. Where requirements conflict, apply the stricter safety condition.

- User responsibility: confirm the viscosity grade, performance level, equipment suitability, site risk and personnel qualification.
- Operator responsibility: record batch numbers, fill quantities, operating parameters, oil-sample results and abnormal-condition handling.
- Technical boundary: this document does not replace equipment design, process design, risk assessment or professional engineering judgement.

MOTTA products covered by this handbook

Product	Grades	Standards and performance levels	Pack sizes
MOTTA H10	VG 150, VG 220, VG 320, VG 460	—	18L / 200L
MOTTA H30	VG 32, VG 46, VG 68, VG 100	DIN 51515 Part 1 (L-TD) · ISO 8068	18L / 200L
MOTTA H50 ISO VG 100	ISO VG 100	—	18L / 200L
MOTTA H50 ISO VG 150	ISO VG 150	—	18L / 200L
MOTTA H50 ISO VG 220	ISO VG 220	—	18L / 200L
MOTTA H50 ISO VG 320	ISO VG 320	—	18L / 200L

Product	Grades	Standards and performance levels	Pack sizes
MOTTA H50 ISO VG 460	ISO VG 460	—	18L / 200L
MOTTA T50	VG 32, VG 46, VG 68, VG 100	DIN 51515 Part 1 (L-TD) · ISO 8068	18L / 200L
MOTTA T100	VG 32, VG 46, VG 68	DIN 51515 Part 1 (L-TD) · ISO 8068	18L / 200L

Grades, standards and pack sizes as published on each product's technical data sheet at motta-lube.com/products/. Where a data sheet and this table differ, the data sheet governs.

DIN 51515-1 and ISO 8068 are the turbine-oil performance levels T50, T100 and H30 are formulated toward, as stated on their data sheets; both classify ISO VG 32 to 100 only, so they are not shown for heavier grades. No turbine- or machine-manufacturer approval is claimed unless separately documented.

2 Selection and pre-use inspection

Important: these five products are not interchangeable. They differ in viscosity range, base oil and additive system. Select by the duty and the performance level the equipment manufacturer specifies, not by viscosity grade alone.

Duty	MOTTA product	Check before use
Steam and light-duty gas turbines	T50, ISO VG 32–100	The turbine manufacturer's oil specification. The data sheet states DIN 51515-1 L-TD and ISO 8068 as the performance level; confirm this meets the manual.
Turbines and systems that require a zinc-free (ashless) oil	T100, ISO VG 32–68	The manufacturer's requirement for a zinc-free oil. Never top up with a zinc-containing anti-wear oil.
Industrial circulating systems and bearings	H30, ISO VG 32–100	Viscosity grade and performance level. Use in a turbine only where the manufacturer's specification is met.
Heavy-duty circulating, gear and bearing systems	H10, ISO VG 150–460	A circulating oil, not a turbine oil. Where gears share the circuit, confirm the gear manufacturer does not require an EP gear oil.
Paper-machine circulating systems	H50, ISO VG 100–460	The machine builder's oil requirement for each section. Synthetic base: follow the conversion steps in Section 7 before changing over.

- Materials: confirm seals, coatings and non-ferrous metals are compatible with the oil, particularly when changing to the synthetic H50.
- System: check the reservoir, breather, return-line filter, cooler, level gauge and pipe connections.
- Verify the product name, viscosity grade, batch number and intact seal before filling.

Additional requirements for turbine oil

Turbine oil must release air quickly and separate water well, because bearing lubrication and governor response are sensitive to entrained air and to steam or condensate ingress. Selection must confirm the performance level the turbine manufacturer specifies.

Additional requirements for paper machines

- Wet-end circulating systems take in process water; water separation and filterability decide how the oil copes. Drain free water from the reservoir at the interval the machine builder sets.
- Dryer-section bearings run hot; oxidation stability and deposit control decide service life there. Record the oil temperature at the bearing return.
- Where the machine builder lists approved oils, use an oil from that list. MOTTA H50 holds no machine-builder approval unless separately documented.

3 Flushing, filling and initial run

- For a new system or after overhaul, flush the system first to remove assembly debris and rust-preventive residue before the formal fill.
- Filling: use dedicated, clean transfer equipment and filter the oil on the way in; do not pour directly from the drum into the reservoir.
- Level: control to the reservoir mark, reserving reasonable room for thermal expansion.
- After filling, run the circulation pump at low pressure and no load first to purge trapped air.
- Take a new-oil sample from the fill and keep it with the batch number; it is the reference for every later result.

4 Start-up and loading

- Confirm the cooler, filters, oil pump and interlocks are in normal condition.
- For a new system, after overhaul or after an oil change, start at low load and observe for abnormal pump noise, vibration and leakage.
- Check that supply pressure and oil temperature establish normally before increasing load in stages.
- After the initial run, re-verify the level, filter differential-pressure indicator and seal condition.

5 Normal operation control

Item	Minimum operating requirement	Key judgement point
Level	Verify periodically against the gauge	Abnormal drop suggests leakage; abnormal rise requires checking for water or fluid ingress
Temperature	Record stable temperature and load variation	Exceeding the equipment limit requires reduced load and cooling-system checks
Pressure / flow	Check system pressure, flow and filter differential pressure	Rising differential pressure suggests filter blockage; pressure fluctuation suggests leakage or pump wear
Appearance	Watch for cloudiness, emulsification or persistent foam	Abnormal appearance suggests water ingress, air entrainment or oxidative degradation
Reservoir water	Drain free water from the reservoir low point where fitted	A rising quantity of drained water points at a cooler, seal or steam-gland leak

> Key control: in turbine and paper-machine systems, watch for deterioration in water-separation performance — a loss of demulsibility is one of the most characteristic ageing signals in a long-life circulating oil.

6 Service-life management and replacement criteria

The service life of this series is normally measured in years, and no service-life commitment independent of operating conditions is given. Manage service life with a new-oil reference, fixed sampling, trend analysis and defined trigger conditions. The equipment manufacturer's or oil-analysis laboratory's limits take precedence.

Baseline and sampling plan

Stage	Recommended minimum arrangement	Control purpose
New oil / initial fill	Retain a representative new-oil sample; record batch number and initial test values	Reference for viscosity, acid number, water content and oxidation-life trends
Post-commissioning	Sample 1–3 months after stable normal operation	Confirm flushing effectiveness and system cleanliness

Stage	Recommended minimum arrangement	Control purpose
Normal operation	At a fixed interval agreed with the laboratory — commonly quarterly for turbines and paper machines, 6–12 months for general circulating systems	Keep the same sampling point, temperature and laboratory method
After an abnormal event or overhaul	Sample promptly after water ingress, overheating, oil mixing or major repair	Do not resume long-term operation on top-up alone before results are confirmed

Test parameters and three-tier judgement

Parameter	Continue in service	Caution / investigate	Action trigger
Kinematic viscosity	Change vs new oil within ±10 %	Change of 10–20 %: shorten the resampling interval	Change above 20 %: replace after laboratory confirmation
Acid number (AN)	Close to the new-oil reference, stable trend	Continuous rise: check oxidation and contamination	Reaches the laboratory's in-service limit: take action
Water / demulsibility	No free water, normal separation time	Separation time lengthening: check seals and condensation	Persistent emulsification: act immediately
Oxidation life (RPVOT)	Above 50 % of the new-oil value	25–50 % of the new-oil value: sample more often	Below 25 % of the new-oil value: plan the oil change

> Note: the figures above are a field-screening starting point where no equipment- or laboratory-specific limit is available. They are not a product guarantee or a universal scrap criterion. The 25 % RPVOT action point follows ASTM D4378 guidance for in-service turbine oils; the 50 % band is common laboratory practice.

Recommended methods: kinematic viscosity ASTM D445; acid number ASTM D664 or D974; demulsibility ASTM D1401; water content ASTM D6304; oxidation life ASTM D2272 (RPVOT); varnish potential ASTM D7843 (membrane patch colorimetry); air release ASTM D3427; foam ASTM D892; cleanliness reported as an ISO 4406 code. The laboratory selects the tests by equipment criticality.

7 Top-up, mixing, conversion and oil change

- Before topping up, verify the product and batch number. Different performance levels or base-oil types must not be mixed directly.
- T100 zinc-free systems: top up only with T100 or an oil the manufacturer confirms is zinc-free. A zinc-containing anti-wear oil defeats the reason the system specifies zinc-free oil.
- Converting to H50 synthetic: drain the system completely, including coolers, filters and low points; flush as the machine builder specifies; check filters more often in the first weeks, because a new oil can loosen existing deposits.
- Where water content, contamination or oxidative degradation is severe, address the system root cause first, then determine the oil-change plan.
- Before draining, shut down, cool, isolate and depressurise; work must follow the site permit system and equipment procedures.

8 Shutdown and abnormal-condition handling

Situation	Primary action
Planned shutdown	Unload and reduce pressure gradually; shut down once the equipment's allowable condition is reached
Rising noise or vibration	Reduce load or shut down; check for pump wear and oil level; sample if necessary
Abnormal temperature rise	Check oil level, cooler condition and load; sample to assess oil condition
Loss of water separation	Trace the seal, cooler or condensation source; assess the need for an oil change
Persistent foam or slow air release	Check for air leaks on the suction side, low level and contamination by another oil
Leakage	Isolate the leak source; select protective equipment and clean-up measures per the SDS

9 Reference values — indicative, not a MOTTA specification

The figures below are published industry references, given so that a reading can be judged on site when the machine documentation is not to hand. They are screening prompts, not scrap limits. Where the equipment manufacturer, the component manufacturer or your oil analysis laboratory states a figure, that figure governs and this table does not apply.

Specification reference

Reference	What it covers	Published by
DIN 51515-1 (L-TD)	Lubricating oils for steam turbines, normal duty — ISO VG 32 to 100	DIN
ISO 8068	Petroleum turbine lubricating oils — classification and requirements	ISO
ASTM D4378	In-service monitoring of mineral turbine oils for steam, gas and combined-cycle turbines	ASTM
ISO 4406	Code for solid-particle cleanliness of the oil	ISO

When a reading is worth investigating

What is measured	Prompt to investigate	Why this figure
Kinematic viscosity at 40 °C	More than ±10 % from the new-oil reference for that product	Common condition-monitoring screening value; also confirms the correct product is in the system
Oxidation life, RPVOT (ASTM D2272)	Below 25 % of the new-oil value	ASTM D4378 guidance: at this level, especially with a rising acid number, plan the oil change
Acid number	A sustained rise above the new-oil reference, confirmed on resample	Acid number rises as oxidation products form; the trend matters more than one result
Varnish potential, MPC ΔE (ASTM D7843)	A rising trend, or a result in the laboratory's elevated band	Membrane patch colorimetry measures the insoluble deposits that form varnish on bearings and servo valves; severity bands are set by the laboratory

What is measured	Prompt to investigate	Why this figure
Demulsibility (ASTM D1401)	Separation time lengthening against the new-oil reference	Loss of water separation is a characteristic ageing and contamination signal in turbine and paper-machine oils
Water content	Above 0.05 % (500 ppm), or any free or emulsified water	Free water attacks additive systems and bearing surfaces at any level
Air release and foam (ASTM D3427, D892)	Persistent foam, or air release slower than the new-oil reference	Entrained air disturbs the bearing film and governor response; contamination by another oil is a common cause
Sustained oil temperature	Above the manufacturer's normal operating range	Oxidation rate roughly doubles for every 10 °C — the standard rule of thumb

Cleanliness targets and analysis limits are set by the turbine or machine manufacturer and your laboratory; where they give a figure, theirs governs. ISO 4406 defines the code, not the target.

A single result is a reason to look, not a reason to drain. Establish the new-oil reference for the product actually in use, trend against it, and find the cause before changing the oil — changing the oil does not remove a contamination source or a mechanical fault.

10 Storage and waste oil

- Keep in the original sealed container in a cool, dry, ventilated area away from moisture, ignition sources and strong oxidisers.
- Store drums under cover, or on their side with the bungs at the 3 and 9 o'clock positions, so rainwater is not drawn in as the drum cools.
- Transfer containers must be clean, dry and clearly labelled. Store synthetic, mineral and zinc-free products separately.
- Waste oil, flushing residue and oil-contaminated materials must be collected separately and handed to a compliant disposal organisation under local regulations.

Use and document information

Caution: this document provides general operating guidance. It is not engineering design, legal advice or a guarantee of results for any specific equipment, process, country or site.

- Conditions of use: confirm the product, equipment, materials, temperature, load, environment and regulations before use. Any unconfirmed substitution or mixing requires a written technical assessment first.
- Data and limits: temperatures, viscosities, intervals, screening values and other figures are governed by the product TDS and SDS, the equipment manufacturer's documents and validated site standards. This document sets no general guaranteed values.
- Safety and environment: storage, handling, filling, draining, spills, fire, first aid and waste-oil disposal must follow the SDS, site rules and local law.
- Limitation: to the extent permitted by applicable law, MOTTA gives no warranty for loss arising from incorrect selection, unconfirmed mixing, contamination, equipment defects, operation outside limits, inadequate maintenance or failure to follow mandatory requirements. This does not exclude liability that cannot be excluded or limited by law.

Revision 02: moved to the current MOTTA document format; added product selection by duty for H30, H10, H50, T50 and T100, with paper-machine and zinc-free turbine oil requirements; replaced an abnormal-condition table that did not apply to circulating systems; added oxidation and varnish monitoring references, the table of MOTTA products covered, and the copyright and trademark notice.

Recommended Records to Retain

Record	Details to retain
Equipment	Unit number, manufacturer, model, location, criticality.
Product	Full product name, viscosity grade, batch number, fill quantity.
Operation	Flushing, draining, filling, start-up and shutdown dates, person responsible.
Running	Temperature, pressure, flow, level, drained water, abnormal events.
Oil analysis	Sampling point, date, running hours, results incl. RPVOT and MPC, trend and action.
Maintenance	Filter changes, leaks, seal replacement, contamination or mixing events.